sulphide, sulphone, and some other new bodies, the author develops some general considerations on the homologous series to which belong the heptylic sulphureted derived substances. These considerations throw fresh light on the evolution of the physical and chemical properties of compound bodies through the various species of a common genus. Thus it is shown that the chemical character of the heptylic combinations must be considered as the development of properties whose source or origin is already found in the lower terms of the series of which heptyl is a member.—A contribution to the study of the development of the epiphysis and of the third eye in reptiles, by M. Francotte. This third eye, of the invertebrate type, already described by Graaf and Spencer, is here exhaustively studied in a large number of reptilian embryos from the province of Namur, in all of which it is very distinctly traced from the epiphysis at the roof of the thalamencephalon to the complete development of the pineal organ. In one species of lizard this eye passes through a series of successive phases each realized in a permanent way in one or other of the adult reptiles. But in all of them the optic nerve has disappeared, which connected the organ with the nerve-centres for a short time in the embryonic state.—This number of the *Bulletin* contains an exhaustive memoir on the fresh-water fishes of Belgium, by Baron Edm. de Selys Longchamps.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, February 16.—"A new Method of determining the Number of Micro-organisms in Air." By Prof. Carnelley, D.Sc., and Thos. Wilson, University College, Dundee. Communicated by Sir Henry Roscoe, F.R.S.

This is a modification of Hesse's well-known process. It consists essentially in the substitution of a flat-bottomed conical flask for a Hesse's tube. Its chief advantages are: (1) much smaller cost of flask and fittings as compared with Hesse's tubes; (2) very much fewer breakages during sterilization; (3) great economy in jelly; (4) freedom from leakage during sterilization; (5) results not vitiated by aërial currents.

"Notes on the Number of Micro-organisms in Moorland Air." By the same Authors.

A number of determinations made last August "on the heather" in the north of Forfarshire show that the pure air from the hills and moors far removed from towns was free from Bacteria, but contained on the average 3·5 moulds per 10 litres of air. In winter the number would be still less.

Linnean Society, March 1.—Mr. Carruthers, F.R.S., President, in the chair.—An interesting collection of ferns from the Yosemite Valley was exhibited by Mr. W. Ransom, who also showed some admirable photographs of rare plants, many of them of the natural size.—Mr. J. E. Harting exhibited a coloured drawing, life-size, of a South American game bird (the Rufous Tinamu) which has been successfully introduced into this country at Brightlingsea, Essex, by Mr. J. Bateman, and made some remarks on its affinities, peculiarities of structure, and habits. In a discussion which followed Prof. Mivart, Mr. Christy, and Mr. W. H. Hudson took part, the last-named giving some account of the bird from personal observation of its habits in the Argentine Republic.—The first paper of the evening was then read by Mr. E. G. Baker on a new genus of Cytinaceæ from Madagascar. This curious plant, to which the author has given the name of *Botryocytinus*, grows parasitically on the trunks of a tree of the natural order *Hamamelideæ*. Its nearest ally is *Cytinus*, of which the best known species grows on the roots of the *Cistuses* of the Mediterranean basin. The Madagascar plant is without any stem, and the sessile flowers grow in clusters, surrounded by an involucre. Each cluster is unisexual, and the ovary is unicellular, with about a dozen parietal placentæ and innumerable minute ovules. It was discovered during a recent exploration of the Sakalava country, by the Rev. R. Baron, of the London Missionary Sooiety.—The next paper, by Mr. J. F. Cheeseman (communicated by Sir Joseph Hooker, F.R.S.), was entitled "Notes on the Fauna and Flora of the Kermadec Islands," and as regards the flora might be considered as supplementary to a paper on the flora of these islands, published by Sir Joseph Hooker more than twenty years ago (Journ. Linn. Soc., 1856). These islands, situated about 450 miles north-east of New Zealand, between that country and Fiji, were shown to be of volcanic origin, with a fauna and flora resembling to a great extent those of New Zealand. A few land birds were noted as common to New Zealand; and to the list of plants drawn up by Sir Joseph Hooker, from collections made by Macgillivray, several new species were added by Mr. Cheeseman, chiefly ferns. A discussion followed, and in illustration of Mr. Cheeseman's remarks, Mr. J. G. Baker exhibited specimens of a new endemic *Duvalia* closely allied to the well-known *D. canariensis* of the Canary Islands and Madeira.

Geological Society, February 17.—Annual General Meeting.—Prof. J. W. Judd, F.R.S., President, in the chair.—The Secretaries read the Reports of the Council and of the Library and Museum Committee for the year 1887. The President presented the Wollaston Gold Medal to Mr. Henry Benedict Medlicott, F.R.S. He also handed to Dr. Archibald Geikie the balance of the proceeds of the Wollaston Donation Fund for transmission to Mr. John Horne, and the Murchison Medal for transmission to Prof. J. S. Newberry. The balance of the proceeds of the Murchison Geological Fund was handed to Dr. Henry Woodward for transmission to Mr. Edward Wilson; and the President presented the Lyell Medal to Prof. H. Alleyne Nicholson, one moiety of the balance of the proceeds of the Lyell Geological Fund to Mr. Arthur Humphreys Foord, and the second moiety of the balance of the proceeds of the Lyell Geological Fund to Mr. Thomas Roberts. The President then read his Anniversary Address, which we have already printed.—The ballot for the Council and Officers was taken, and the following were duly elected for the ensuing year:—President: W. T. Blanford, F.R.S. Vice-Presidents: John Evans, F.R.S.; Prof. T. McKenny Hughes; Prof. J. Prestwich, F.R.S.; Henry Woodward, F.R.S. Secretaries: W. H. Hudleston, F.R.S.; J. E. Marr. Foreign Secretary: Sir Warington W. Smyth, F.R.S. Treasurer: Prof. T. Wiltshire. Council: W. T. Blanford, F.R.S.; John Evans, F.R.S.; L. Fletcher; A. Geikie, F.R.S.; Henry Hicks, F.R.S.; Rev. Edwin Hill; W. H. Hudleston, F.R.S.; J. W. Hulke, F.R.S.; Prof. T. McKenny Hughes; Prof. T. Rupert Jones, F.R.S.; Prof. J. W. Judd, F.R.S.; R. Lydekker; Lieut.-Col. C. A. McMahon; J. E. Marr; E. T. Newton; Prof. J. Prestwich, F.R.S.; Prof. H. G. Seeley, F.R.S.; Sir Warington W. Symth, F.R.S.; W. Topley; Rev. G. F. Whidborne; Prof. T. Wiltshire; Rev. H. H. Winwood; Henry Woodward, F.R.S.

February 29.—W. T. Blanford, F.R.S., President, in the chair.—The following communications were read:—An estimate of post-Glacial time, by T. Mellard Reade. The author showed that there exists on the coasts of Lancashire and Cheshire an important series of post-Glacial deposits which he has studied for many years. The whole country to which his notes refer was formerly covered with a mantle of low-level marine boulder-clay and sands, and the valleys of the Dee, Mersey, and Ribble were at one time filled with these Glacial deposits. These Glacial beds have been much denuded, especially in the valleys, where the rivers have cleared them out, in some cases, to the bed rock. Most of this denudation occurred during a period of elevation succeeding the deposition of the low-level boulder-clay. On this eroded surface and in the eroded channels lie a series of post-Glacial beds of a most interesting and extensive nature. They consist of estuarine silt and *Scrobicularia* clay covered by extensive peat-deposits, containing the stools of trees rooted into them. Upon these lie, in some places, recent tidal silts, and on the coast margin blown sand and sand dunes. The series of events represented by the denudation of the low-level boulder-clay and the laying down of these deposits is as follows:—(1) Elevation succeeding the Glacial period, during which time the boulder-clay was deeply denuded in the valleys. (2) Subsidence to about the 25-feet contour, when the estuarine silts and clays were laid down. (3) Re-elevation, representing most probably a continental connection with the British Isles, during which time the climate was milder than at present, and big trees flourished where now they will not grow. (4) Subsidence to the present level, the submersion of the peat and forest-beds, the laying down of tidal silt upon them, and the accumulation of blown sand along the sea-margin extending to a considerable distance in an inland direction. It was estimated, from a variety of considerations, that these events, all posterior to the Glacial period, represent a lapse of time of not less than 57,500 years, allotted as follows: 40,000 years for the elevation succeeding the Glacial period, measured by the denudation of the boulder-clay in the valleys; 15,000 years for the accumulation of the estuarine silts, clays, peat, and forest beds; and 2500 years for the blown sand. In the discussion which followed the reading of this paper Prof. Prestwich, Mr. De Rance, Dr. Evans, and others took part.—Note on the movement of scree-material, by Charles Davison. Communicated by Prof. T. G. Bonney, F.R.S.—On some additional occurrences of tachylyte, by Grenville A. J. Cole.—Appendix to Mr. A. T. Metcalfe's paper "On Further Discoveries of Vertebrate Remains in the Triassic Strata of the South Coast of Devonshire, between Budleigh Salterton and Sidmouth," by H. J. Carter, F.R.S. Communicated by A. T. Metcalfe.

Mathematical Society, March 8.—Sir J. Cockle, F.R.S., President, in the chair.—The following papers were read:—Supplementary remarks on the theory of distributions, by Capt. P. A. MacMahon, R.A.—Complex multiplication moduli, by Mr. A. G. Greenhill.—Geometrical proof of Feuerbach's nine-point circle theorem, by Prof. Genese.—Isostereans, by Mr. R. Tucker.

Anthropological Institute, February 28.—Francis Galton, F.R.S., President, in the chair.—The election of Mr. Henry C. Collyer was announced.—Dr. Edward B. Tylor read a communication from Mr. Basil Hall Chamberlain, on the Japanese "go-hei," or paper offerings to the Shinto gods. In olden times the offerings were made of cloth, but later on, when Chinese civilization had brought a variety of manufactures in its train, hempen cloth ceased to be regarded as a treasure worthy of divine acceptance, and paper began to be used instead. The "go-heis" used by different sects differ slightly from one another, chiefly in the number of the folds: the Yoshida sect sanctions the use of four folds, while the Shirakawa sect has eight. There is said to be no symbolism attaching to the shape, number of folds in the paper, or the length of the stick; each sect has clung to its traditional practice in these matters. Specimens of "go-heis" were exhibited in illustration of the paper.—Mr. Henry Balfour exhibited a series of decorated arrows from the Solomon Islands, in illustration of his theory of the manner in which the decoration of the shafts was gradually developed.—Dr. Tylor gave a brief account of a paper by Mr. A. W. Howitt, "Further Notes on the Australian Class Systems," and in the course of the discussion the President showed a very simple method of understanding the complicated-looking system of Australian marriages, by supposing a cross-division of the tribes.

EDINBURGH.

Royal Society, February 6.—Sir W. Thomson, President, in the chair.—Prof. Crum Brown showed and described an apparatus for exhibiting the action of the semicircular canals. The apparatus is also capable of application as an instrument for the measurement of the irregularity of angular motion.—Mr. John Murray read a paper on the temperature and currents in the lochs of the west of Scotland, as affected by winds. He showed that when the wind is blowing off shore the warm surface water is blown outwards and cold water takes its place from beneath. When the wind blows on shore the warm surface water is driven inwards. This point is of great importance, as it has an evident bearing on the growth of coral-forming animals.—Mr. Murray also communicated a paper by Mr. W. G. Reid on the solution of carbonate of lime in sea water under pressure. The results of Mr. Reid's experiments show that the solubility is increased by pressure.—Mr. Murray then discussed the distribution of carbonate of lime on the floor and in the waters of the ocean.—Mr. John Aitken read a paper (see NATURE, March 1, p. 428) on the number of dust particles in the atmosphere, giving a full account of the apparatus used and the method of experimenting.

PARIS.

Academy of Sciences, March 5.—M. Janssen in the chair.—Remarks on the first volume of Fourier's works presented to the Academy, by M. G. Darboux. This volume of the complete edition of Fourier's works, now being issued with the aid of the Minister of Public Instruction, contains the full text of the "Théorie analytique de la Chaleur," carefully revised by MM. Darboux and Paul Morin.—On the transformation of the nitrates present in the soil into nitrous organic compounds, by M. Berthelot. The experiments here described have been carried out for the purpose of showing that the nitrates contained in the ground do not occur in an integral state even independently of the formation of the higher plants. On the contrary, they may be changed into nitrous principles of organic nature under the influence of chemical agents properly so-called, or of certain microbes present in the soil. It is suggested that these microbes assimilate the combined nitrogen when presented to them in a convenient form, preferring it to the free nitrogen of the atmosphere, thus reversing the action of the microbes of nitrification. The general inference is that the assimilation of the nitrogen of the nitrates by plants is accompanied, if not preceded, by their transformation into nitrous organic compounds in the earth under the influence of chemical reactions and special microbes. These microbes are perhaps the same as those which fix free atmospheric nitrogen in soil destitute of nitrates. In this way might be formed true azoic compounds derived at once from the oxygenated and hydrogenated compounds of nitrogen.—On perfect numbers, by Prof. Sylvester. A slight omission pointed out by M. Mansion in the author's recent paper on this subject is shown in no way to affect the validity of the demonstration.—On *Saccharomyces ellipsoideus* and its industrial applications to the manufacture of a barley wine, by M. Georges Jacquemin. A process is described by which a tartarized wort of barley is made to yield a true wine of pleasant taste, and more nutritive than grape wine, containing as it does more respiratory aliments, besides an albuminoid substance, and a larger proportion of phosphates calculated to restore the nervous system and the bony tissues. It also differs from white grape wine by being copiously precipitated by tannin, while a portion of the malt may be replaced by crushed grain (wheat or barley) that has not sprouted. This wheat or barley wine is stated to be equal in quality and cheaper than that of pure malt, and the vinous wort in question is an alcoholic fermentation of a totally distinct character from the ordinary yeast of beer.—Immediate solution of equations by means of electricity, by M. Felix Lucas. A method is described by which an algebraic equation of any degree with real numerical coefficients may be directly solved without calculations by means of electricity. The process here explained is much more rapid than the two methods indicated in previous communications. However high the equation, a single operation suffices to obtain all the roots, real or imaginary. "The power of electricity as a calculator is not to be limited."—On the electric conductibility of concentrated nitric acid, by M. E. Bouty. In previous papers it was shown that a very slight addition of alkaline nitrates to the acid increases its conductibility to a considerable extent. Here it is made evident that the addition of water also causes an increase of conductibility nearly proportionate to the quantity of added water. This approximate proportion is maintained even much further than with the nitrates, nearly to $NO_5,4HO$. A table is given showing the degrees of conductibility measured at 0° C., and referred to that of the normal solution of nitric acid at one equivalent per litre, the specific resistance being 4·59 ohms.—On cinchoniline, by MM. E. Jungfleisch and E. Léger. In previous communications the conditions were explained under which cinchoniline is formed and separated in the state of a di-iodhydrate. Here the authors deal with this base and its chief derivatives. That this substance, which has the formula $C_{38}H_{22}N_2O_2$, is isomerous with cinchonine, is made evident not only by the analysis of the base itself, but also of that of a large number of combinations. In ether it forms magnificent rhomboidal prisms, colourless, anhydrous, and often attaining a weight of several grammes. It dissolves readily in ordinary alcohol, but with difficulty in water, its aqueous solution giving a deep blue tint to turnsol (Dutch orchil), and a red to the phthaleine of phenol. Its basic and neutral salts present some remarkable crystallographic properties.—Products of the oxidation of the hydronitrocamphenes, by M. C. Tanret. From the oxidation of these substances the author has obtained several new compounds, which are here described. The new substance, answering to the formula $C_{80}H_{64}N_4O_{16}$, he proposes to call nitrocamphene (*azocamphène*), distinguishing its two modifications as cyanonitrocamphene and leukonitrocamphene. They are isomerous, their analysis yielding the same constituents.—On terpinol, an artificial reproduction of eucalyptol (terpane), by MM. G. Bouchardat and R. Voiry. These researches show that the terpinol of List is formed of a crystallized inactive terpilenol or terpol, $C_{20}H_{18}O_2$, boiling at 218° C.; of terpane, $C_{20}H_{18}O_2$, boiling at 175°, and capable of crystallizing at $-1°$; lastly of inactive terpilene, $C_{20}H_{16}$. Terpane, which term is here substituted for the older cineol, eucalyptol, cajeputol, spicol, &c., differs also from the active and inactive terpilenols by refusing to combine either with the acids or the anhydrides to yield ethers.—Deleterious influence of alcohol on offspring, by MM. A. Mairet and Combemale. The results are described of some experiments on dogs, showing that their progeny were injuriously affected for two successive generations by the influence of alcohol administered under various conditions to the parents.

BERLIN.

Physiological Society, February 10.—Prof. du Bois Reymond, President, in the chair.—Dr. Baginski spoke on the origin and course of the auditory nerve. As the result of experiments on young cats, in which the peripheral end of this nerve had been destroyed, and which were then killed at the end of six weeks, he was able to follow the course of the degeneration by means of a series of sections through the root of the nerve to the posterior corpus quadrigeminum. In this way his earlier experiments on rabbits were fully confirmed. The degeneration spread to the olivary body of the same side, and was continued through the trapezium of the pons. After removal of the facial nerve the olivary body was similarly found to be affected. These observations are closely connected with those of von Monakow, who found that destruction of the auditory centre, described by Munk, led to a degeneration which could be traced right into the hinder corpora quadrigemina. At present no observations are in existence as to the course of the anterior root of the auditory nerve.—Dr. Rawitz gave an account of the results of his researches on the eyes of mussels, and explained the same by reference to preparations which he exhibited. Three distinct types may be observed among the eyes, sometimes to the number of one hundred, which occur on the edge of the mantle of Pecten. Each eye consists of an epithelial layer, a lens, and a retina composed of rods, whose ganglionic layer is on the side turned towards the light, while the rods are turned away from the light and abut on the tapetum and layer of pigment cells. The speaker had been able to trace the endings of the nerves through the cells connected with the rods into the rod itself. The mussels are only able to see with the central portions of each eye.—Dr. Virchow presented and explained a plaster cast of the gluteal region. He had had this cast made in order to throw light upon a deep furrow which extends from the gluteus maximus to the tensor muscle, and is not due to the edge of either of these muscles. This furrow may be observed in the sitting posture, and is due to the stretching by the point of the trochanter of a portion of the fascia which envelop the gluteus medius: by this means the gluteus medius is divided into two projecting portions. When this muscle contracts, the furrow disappears.

February 24.—Prof. du Bois-Reymond, President, in the chair.—Prof. Liebreich spoke on the testing of the action of local anæsthetics on animals. There are a number of substances which, when injected subcutaneously, give rise to a localized anæsthesia in the immediate neighbourhood of the place where they are injected. Antipyrin, sal-ammoniac, salts of tannin, resorcin, chloride of iron, and other substances have this action, although there is neither chemical nor physiological similarity between them. They possess, however, this property in common, that they all have a corrosive action on the tissues, when this expression is understood to imply any kind of alteration of molecular structure. The alkaloids, in the cases where they possess a local anæsthetic action, act in the same way, as, for instance, erythrophoein. Cocaine alone is an exception to the rule, inasmuch as it is a local anæsthetic, but does not corrode the tissues. When applied subcutaneously to man, the above substances either produce no localized anæsthesia, or one which is very imperfect. When testing the action of anæsthetics on the eye, it is essential to take into account the difference in sensitiveness of the conjunctiva and cornea, as already pointed out by Claude Bernard.—Dr. Virchow exhibited a plaster cast of the hip-region taken from a female corpse in a hanging position. It brought to light a whole series of most surprising relationships which can never be observed, in preparations made from a corpse in the recumbent position, as at all corresponding to those existing in the erect posture. One of the most striking facts is the considerable stretching of the sciatic nerve, which must be still greater when the leg is advanced, as in walking.—Dr. Virchow further spoke on the striæ medullares acusticæ in man, in connection with the statement made before the Society a fortnight before by Dr. Baginski. His experiments have shown, in correspondence with the results of many other observers, that the striæ can be traced through the raphe to the other side of the medulla. It must still remain an open question whether the fibres which lead to the anterior root of the auditory nerve have a different course in cats and rabbits (examined by Baginski) than they have in man (examined by the speaker), or whether in the above-named animals we have to deal with a frequently-recurring division and rearrangement of the fibres of any one tract.

Physical Society, February 17.—Prof. Helmholtz, President, in the chair.—Prof. Lampe made a report on McGregor's book, "An Elementary Treatise on Kinematics and Dynamics."—Prof. Börnstein exhibited an electricity-meter which enables the intensity of the current to be read off direct.—Dr. Gerstmann gave an account of a preliminary communication by Aubel on the influence of temperature and magnetization on the electrical resistance of bismuth.—Dr. Kötter spoke on a problem in the theory of projectiles—namely, that a bullet shot out of a rifle tends to deviate in a direction away from the side on which the bayonet is attached to the muzzle.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

Johnston's Botany Plates (Johnston).—The Testing of Materials of Construction: W. C. Unwin (Longmans).—Leitfaden der Zoologie: Dr. B. Graber (Tempsky).—Science Sketches: D. S. Jordan (McClurg).—Home Experiments in Science: T. O. Sloane (Low).—Memoirs of the Manchester Literary and Philosophical Society, 3rd series, vol. x.; Proceedings of the Manchester Literary and Philosophical Society, vols. xxv. and xxvi. (Manchester).

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